USER MANUAL V1.1

Transmitter Module
PTM 33x / PTM 33xC / PTM 330U

June 21, 2013

Observe precautions! Electrostatic sensitive devices!

Patent protected:
WO98/36395, DE 100 25 561, DE 101 50 128,
WO 2004/051591, DE 103 01 678 A1, DE 10309334,
WO 04/109236, WO 05/096482, WO 02/095707,
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Subject to modifications
PTM 33x / PTM 33xC / PTM 330U User Manual
V1.1
June 21, 2013

REVISION HISTORY

The following major modifications and improvements have been made to the first version of this document:

No	Major Changes
0.81	CFG Pin: For test purposes only
0.85	Antenna length 868 MHz changed to 86 mm; upper limit of operating temperature reduced to 65 °C
0.90	Equivalent energy pulse definition added
1.00	Max. supply voltage for programming interface added in 2.4. Digital input parameters added in 2.3. FCC / IC grants added in 4.2 and 4.3.
1.01	TX power increased to 3 dBm at antenna input; Chapter Related Documents added; misleading table removed in 3.3
1.02	Figure corrected in 3.4
1.03	3.4 modified
1.1	Meander structures increased; PTM 330U added

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Important!

This information describes the type of component and shall not be considered as assured characteristics. No responsibility is assumed for possible omissions or inaccuracies. Circuitry and specifications are subject to change without notice. For the latest product specifications, refer to the EnOcean website: http://www.enocean.com.
As far as patents or other rights of third parties are concerned, liability is only assumed for modules, not for the described applications, processes and circuits.
EnOcean does not assume responsibility for use of modules described and limits its liability to the replacement of modules determined to be defective due to workmanship. Devices or systems containing RF components must meet the essential requirements of the local legal authorities.
The modules must not be used in any relation with equipment that supports, directly or indirectly, human health or life or with applications that can result in danger for people, animals or real value.
Components of the modules are considered and should be disposed of as hazardous waste. Local government regulations are to be observed.
Packing: Please use the recycling operators known to you.

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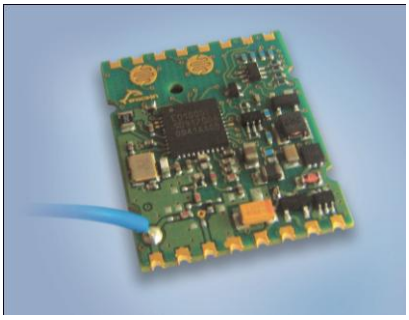
1 RELATED DOCUMENTS

In addition to this document additional information is available on our web site:

- Proposal for mechanical integration with ECO 200 in 2D and 3D format
- Footprint with positions of pads available in Protel and Gerber format
- AN102: Antenna Basics – Basic antenna design considerations for EnOcean based products

2 GENERAL DESCRIPTION

2.1 Basic Functionality



The radio transmitter module PTM 330 from EnOcean enables the implementation of wireless sensors and switches without batteries.

Key applications are handheld remote controls or industrial switches.

Functional Principle
When an energy pulse is supplied (e.g. by ECO 200 from EnOcean) an RF telegram is transmitted including a unique 32-bit module ID, the polarity of the energy pulse, and the operating status of 4 digital inputs. The RPS telegram content can be configured if other content is needed.

PTM 330 can be connected to ECO 200 via a contact spring. There are two meander structures on the PCB which allow usage of a rubber pad to set the level of two digital inputs. Alternatively PTM 330 can be mounted as an SMD component onto a host PCB. In this case energy supply pins and digital input pins are accessible via contact pads.

Product variants

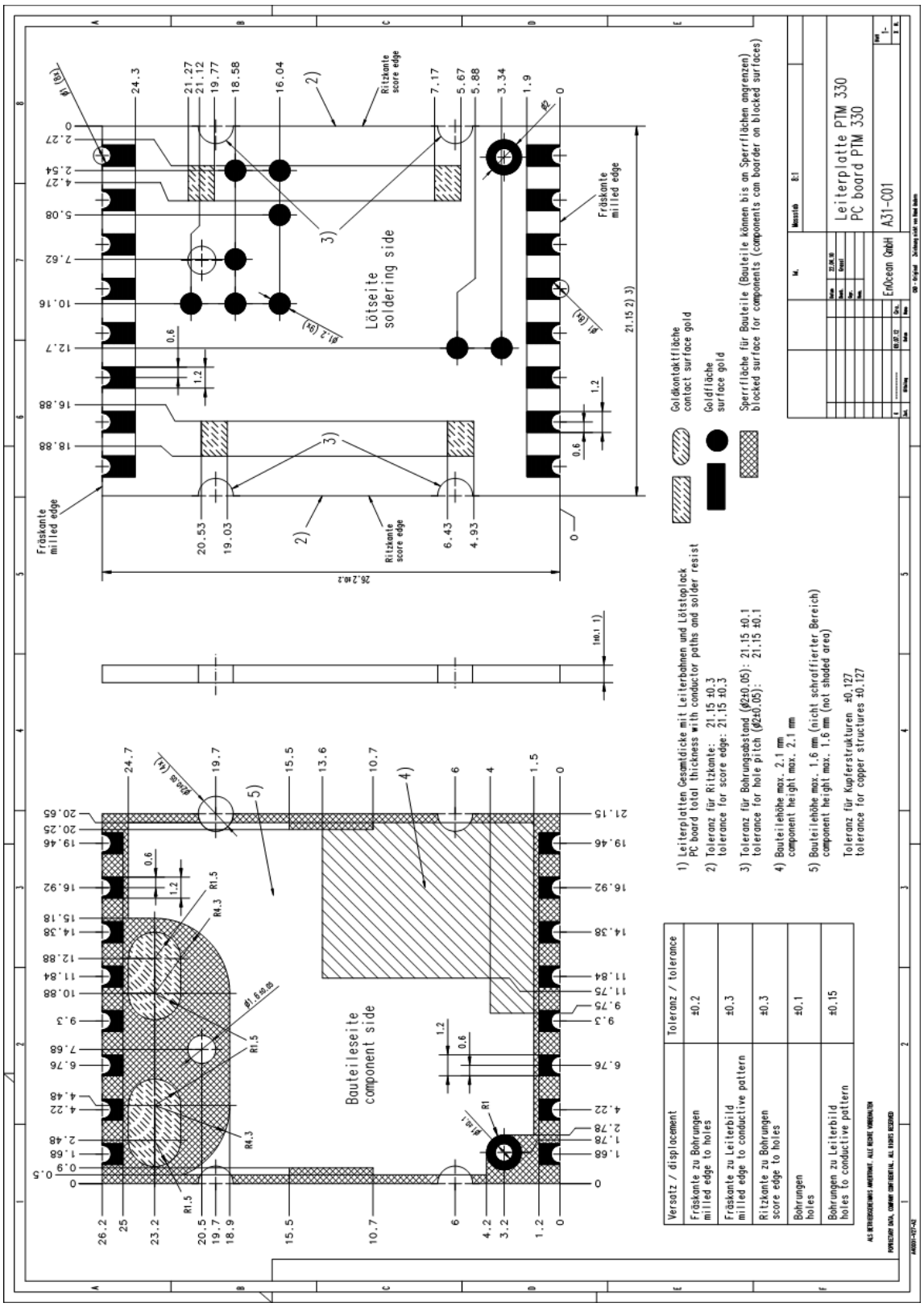
- PTM 330: 868 MHz variant, pre-installed whip antenna, delivery in card board box
- PTM 332: 868 MHz variant, no pre-installed antenna, delivery as tape & reel
- PTM 330C: 315 MHz variant, pre-installed whip antenna, delivery in card board box
- PTM 332C: 315 MHz variant, no pre-installed antenna, delivery as tape & reel
- PTM 330U: 902 MHz variant, pre-installed whip antenna, delivery in card board box

2.2 Technical Data

Power supply	ECO 200 or equivalent energy pulse
Antenna	pre-installed whip antenna PTM 330/330C/330U external 50 Ohm or whip antenna PTM 332/332C
Frequency	868.3 MHz (PTM 33x) / 315.0 MHz (PTM 33xC) / 902.875 MHz (PTM 330U)
Transmission power	typ. 3 dBm (PTM 33x, PTM 33xC) / 1dBm (PTM 33xU) at antenna base
Data rate / Modulation type	125 kbps / ASK(315MHz, 868MHz), FSK(902MHz)
Telegram type	RPS of type 2 (allows interpretation of operating two buttons simultaneously)
Digital inputs	4
Transmission range	up to 200 m free field, up to 30 m indoor

2.3 Physical Dimensions

PCB dimensions 26.2 x 21.15 x 3.5 mm



2.4 Environmental Conditions

Operating temperature	-25 °C … +65 °C
Storage temperature	-40 °C … +85 °C
Storage temperature in Tape&Reel	-20 °C … +50 °C
Humidity	0% … 93% r.h., non-condensing

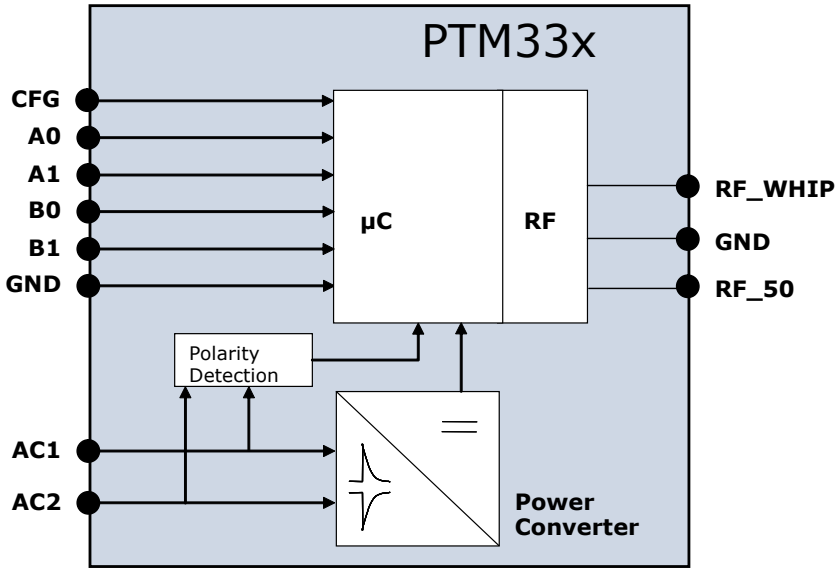
2.5 Ordering Information

Type	Ordering Code	Frequency	Note
PTM 330	**S3001-A330**	**868.3 MHz**	**Whip antenna mounted Card board box**
PTM 332	**S3001-A332**	**868.3 MHz**	**No antenna mounted Tape & Reel**
PTM 330C	**S3031-A330**	**315.0 MHz**	**Whip antenna mounted Card board box**
PTM 332C	**S3031-A332**	**315.0 MHz**	**No antenna mounted Tape & Reel**
PTM 330U	**S3051-A330**	**902.875 MHz**	**Whip antenna mounted Card board box**

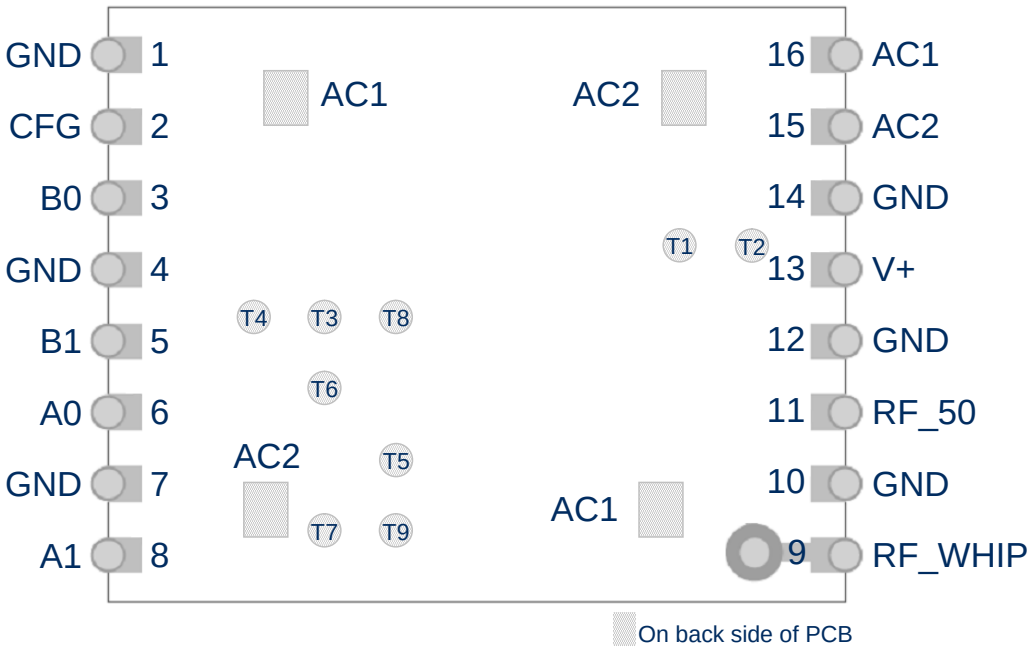
3 FUNCTIONAL DESCRIPTION

3.1 Block diagram

At power-up by an energy pulse at AC1, AC2 a DC voltage is provided to the internal micro controller. The microcontroller reads the polarity of the supply voltage pulse and the status of the digital inputs A0, A1, B0, B1. After that 3 identical radio telegrams calculated from the status of these inputs are transmitted.



3.2 Pin out

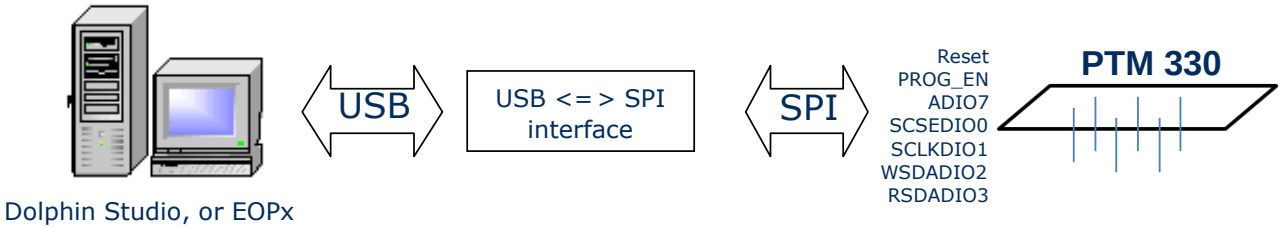


3.3 Pin Description and operational characteristics

Symbol	Function	Characteristics
GND	Ground connection	Must be connected to GND
V+	For test purposes only	Do not connect
B0	O-Button Rocker B	Digital input, leave open or connect to GND Internal pull-up
B1	I-Button Rocker B	Digital input, leave open or connect to GND Internal pull-up
A0	O-Button Rocker A	Digital input, leave open or connect to GND Internal pull-up
A1	I-Button Rocker A	Digital input, leave open or connect to GND Internal pull-up
CFG	For test purposes only	Internal pull-up
AC1	Input for ECO 200	ECO 200 or equivalent energy pulse
AC2	Input for ECO 200	ECO 200 or equivalent energy pulse
RF_WHIP	RF output	Output for whip antenna
RF_50	RF output	50 Ohm output for external antenna (not available for PTM 330U)
T1-9	Configuration Interface	See 3.4

3.4 Configuration Interface

Via the programming interface the telegram content can be modified.
The interface is shown in the figure below:



Dolphin Studio, or EOPx

EnOcean provides EOPx (EnOcean Programmer, a command line program) and Dolphin Studio (Windows application for chip configuration, programming, and testing) and the USB/SPI programmer device as part of the EDK 300 / 350 developer's kits. In order to contact PTM 330 programming and testing points a needle bed adapter is needed.

Pad	Symbol	Function	Characteristics
T1	VDD	Supply voltage	Interface to programmer; Max. 3.3 V
T2	GND	Ground connection	Interface to programmer
T3	SCSEDIO0	SPI chip select	Interface to programmer
T4	SCLKDIO1	SPI serial clock	Interface to programmer
T5	WSDADIO2	SPI input	Interface to programmer
T6	RSDADIO3	SPI output	Interface to programmer
T7	RESET	Reset	Interface to programmer, internal pull down
T8	ADIO7	Sync output	
T9	PROG_EN	Enable programming mode	Interface to programmer HIGH: programming mode active LOW: operating mode Internal pull-down

3.5 Absolute maximum ratings (non operating)

Symbol	Parameter	Min	Max	Units
AC1 AC2	Supply voltage	0	6.4	V
GND	Ground connection	0	0	V
A0 A1 B0 B1	Voltage digital input pins	0	0	V

3.6 Maximum Ratings (operating)

Symbol	Parameter	Min	Max	Units
AC1 AC2	Supply voltage	0	6.0	V
GND	Ground connection	0	0	V
A0 A1 B0 B1	Voltage digital input pins	0	0	V

3.7 Radio telegram

3.7.1 Normal operation

In default configuration PTM 33x transmits the same telegrams as a PTM 210 radio switch:

- Telegram type RPS: There are two message types depending on how many buttons (A0, A1, B0, B1) have been pressed (connected to GND)
  - N-message: Only one or two buttons have been pressed.
  - U-message: No pushbutton was pressed when activating the energy generator, or more than two pushbuttons have been pressed.
- Unique factory programmed 32 bit ID
- DATA_BYTE2, DATA_BYTE1, DATA_BYTE0=0
- DATA_BYTE3 and STATUS as follows:

N-message:

DATA_BYTE3:

7					**0**
RID	**UD**	**PR**	**SRID**	**SUD**	**SA**

RID	(2 bit)	Rocker ID, A=0, B=1
UD	(1 bit)	UD=1 → O-button, UD=0 → I-button
PO	(1 bit)	Polarity, see table below
SRID	(2 bit)	Second Rocker ID
SUD	(1 bit)	(Second) SUD=1 → O-button, SUD=0 → I-button
SA	(1 bit)	SA=1 → Second action (2 buttons pressed simultaneously), SA=0 → No second action

STATUS:

7				**0**
Reserved	**T21**	**NU**	**RP_COUNTER**	

Reserved	(2 bit)	For future use
T21	(1 bit)	1
NU	(1 bit)	NU=1 → N-message.
RP_COUNTER	(4 bit)	Repeater level: 0 is original message (not repeated)

U-message:

DATA_BYTE3:

7		0
BUTTONS	**PR**	**Reserved**

BUTTONS (3 bit) Number of simultaneously pressed buttons, as following:

0 = 0 Button
1 = not possible
2 = not possible
3 = 3 or 4 buttons
4 = not possible
5 = not possible
6 = not possible
7 = not possible

PO (1 bit) Polarity, see table below
Reserved (4 bit)

STATUS:

7			0
Reserved	**T21**	**NU**	**RP_COUNTER**

Reserved (2 bit) For future use
T21 (1 bit) 1
NU (1 bit) NU=0 → U-message.
RP_COUNTER (4 bit) Repeater level: 0 is original message (not repeated)

The polarity PO is defined as follows:

AC1	AC2	PO
-	+	1
+	-	0

3.7.2 User defined operation

Via the configuration interface it is possible to define different content of DATA_BYTE3 and define if a N-message or U-message shall be sent. This allows for example to transmit other RORG=F6 telegrams, e.g. "Mechanical handle", as described in the EnOcean Equipment Profiles defined by EnOcean Alliance.
For details please refer to the EnOcean Equipment Profiles 2.5 specification.

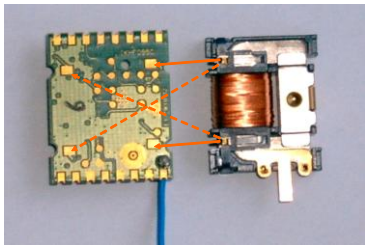
3.8 Transmit timing

The setup of the transmission timing allows avoiding possible collisions with data packages of other EnOcean transmitters as well as disturbances from the environment. With each transmission cycle, 3 identical subtelegrams are transmitted within 40 ms. The transmission of a subtelegram lasts approximately 0.7 ms. The delay between the three transmission bursts is affected at random.

4 APPLICATIONS INFORMATION

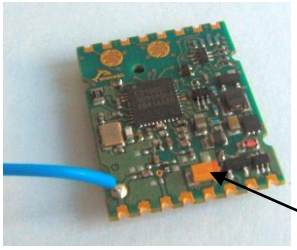
4.1 How to connect an energy harvester

PTM 330 can be connected to ECO 200 without soldering. ECO 200 provides contact springs which can directly be connected to contact pads of PTM 330. The contact pads on the bottom of the PCB are shown below (left). A second orientation where PTM 330 is rotated 180° with respect to ECO 200 is also possible as shown with dashed lines.



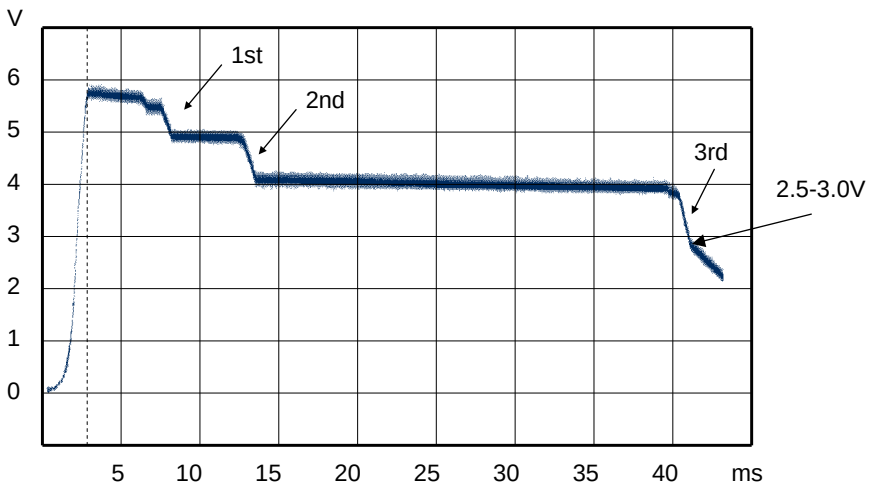
4.2 How to generate an equivalent energy pulse

PTM330 can also be operated from an external equivalent energy pulse.
As the source impedance is not known a procedure is defined how to find the needed duration of the pulse.
The pulse must provide a voltage between 5 V and 6 V for maximum 10 ms time.



The length of this supply pulse needs to be defined by measuring the remaining voltage on the storage capacitor after the 3rd subtelegram, according to the following procedure:

1) Discharge the storage capacitor (see photo) completely
2) Apply a short pulse, voltage between 5 V to 6 V which charges the capacitor
3) Measure the voltage drop at the storage capacitor to ground (between pin 13 and pin 12) while the sub-telegrams are being transmitted with an oscilloscope
4) The remaining voltage shortly after the 3rd sub-telegram should be 2.5 to 3.0 V



4.3 Antenna

315 MHz

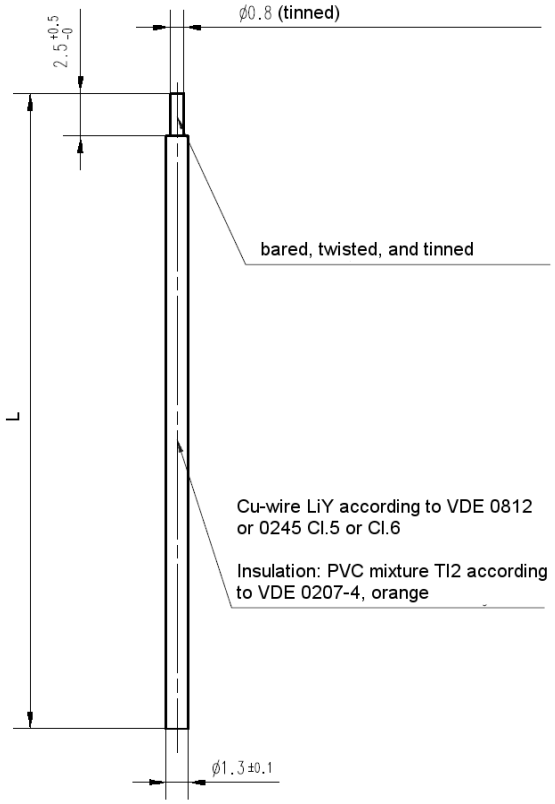
Option 1: 150 mm wire, connect to RF_WHIP
Option 2: A 50 Ω antenna can be connected to RF_50.
In this case the limited modular FCC/IC approval is not valid!
An FCC/IC approval is then needed for the end device!

868 MHz

Option 1: 86 mm wire, connect to RF_WHIP
Option 2: A 50 Ω antenna can be connected to RF_50

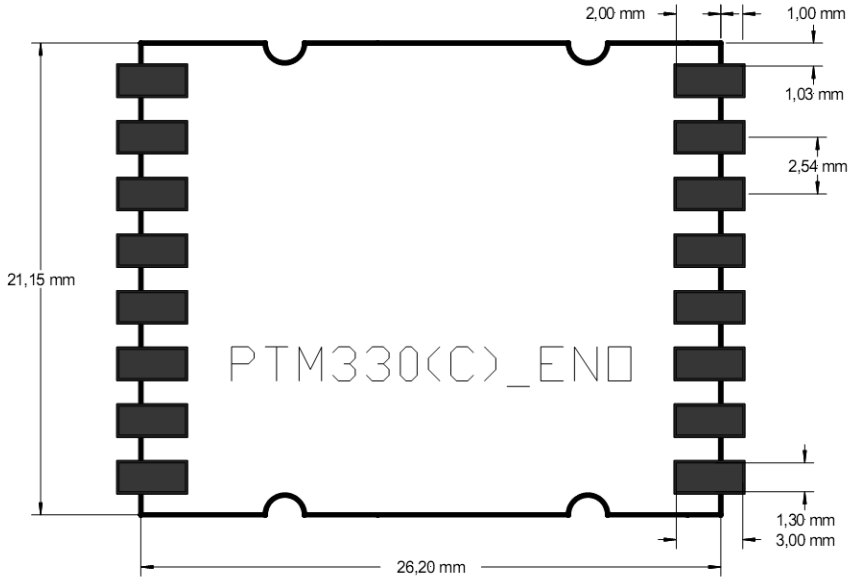
902 MHz

64 mm wire, connect to RF_WHIP

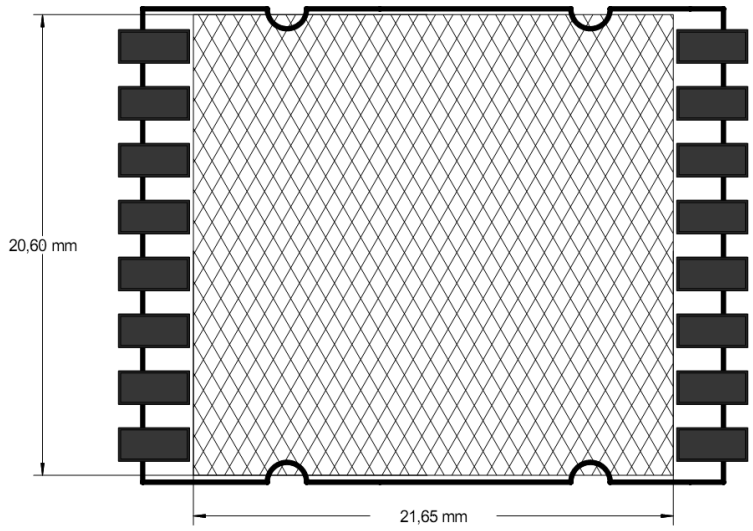


Specification of the whip antenna; L=150 mm @ 315 MHz, L=86 mm @ 868 MHz, L=64 mm @ 902 MHz

4.4 Layout recommendations



Proposal for foot print on host PCB



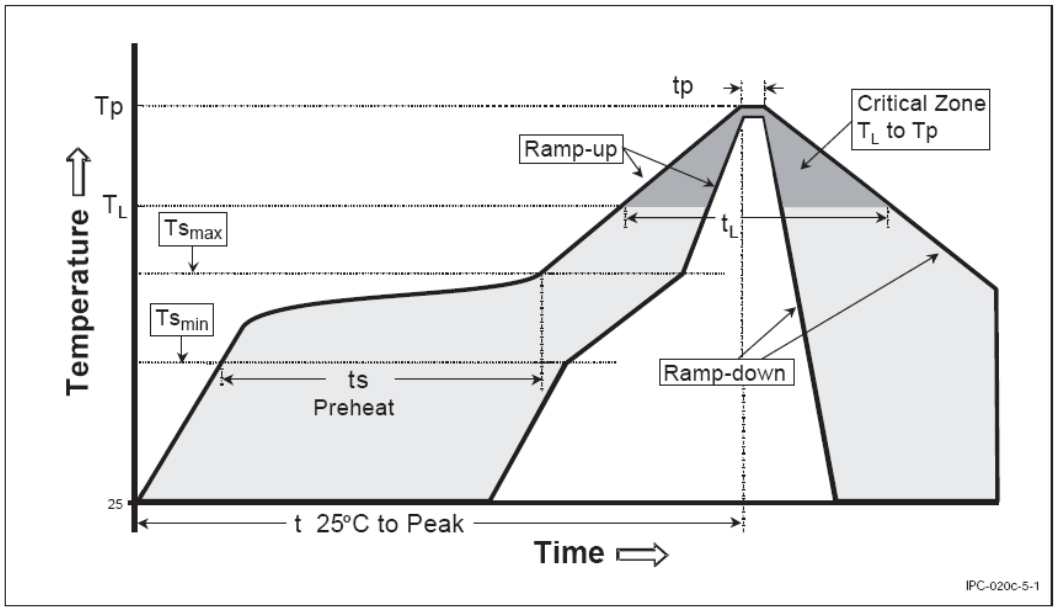
Keep out area on host PCB. No copper surface area allowed!

4.5 Soldering information PTM 332/332C

PTM 332 has to be soldered according to IPC/JEDEC J-STD-020C standard.

Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to Tp)	3° C/second max.
Preheat – Temperature Min (Ts_{min}) – Temperature Max (Ts_{max}) – Time (ts_{min} to ts_{max})	 150 °C 200 °C 60-180 seconds
Time maintained above: – Temperature (T_L) – Time (t_L)	 217 °C 60-150 seconds
Peak/Classification Temperature (Tp)	260 °C
Time within 5 °C of actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	6 °C/second max.
Time 25 °C to Peak Temperature	8 minutes max.

Note 1: All temperatures refer to topside of the package, measured on the package body surface.



PTM 332 shall be handled according to Moisture Sensitivity Level MSL4 which means a floor time of 72 h. PTM 332 may be soldered only once, since one time is already consumed at production of the module itself.

Once the dry pack bag is opened, the desired quantity of units should be removed and the bag resealed within two hours. If the bag is left open longer than 30 minutes the desiccant should be replaced with dry desiccant. If devices have exceeded the specified floor life time of 72 h, they may be baked according IPC/JEDEC J-STD-033B.
Devices packaged in moisture-proof packaging should be stored in ambient conditions not exceeding temperatures of 40 °C or humidity levels of 90% r.h.

PTM 332 modules have to be soldered within 6 months after delivery!

4.6 Transmission range

The main factors that influence the system transmission range are type and location of the antennas of the receiver and the transmitter, type of terrain and degree of obstruction of the link path, sources of interference affecting the receiver, and "Dead" spots caused by signal reflections from nearby conductive objects. Since the expected transmission range strongly depends on this system conditions, range tests should categorically be performed before notification of a particular range that will be attainable by a certain application.

The following figures for expected transmission range are considered by using a PTM, a STM or a TCM radio transmitter device and the TCM radio receiver device with preinstalled whip antenna and may be used as a rough guide only:

- Line-of-sight connections: Typically 30 m range in corridors, up to 100 m in halls
- Plasterboard walls / dry wood: Typically 30 m range, through max. 5 walls
- Line-of-sight connections: Typically 30 m range in corridors, up to 100 m in halls
- Ferroconcrete walls / ceilings: Typically 10 m range, through max. 1 ceiling
- Fire-safety walls, elevator shafts, staircases and supply areas should be considered as screening.

The angle at which the transmitted signal hits the wall is very important. The effective wall thickness – and with it the signal attenuation – varies according to this angle. Signals should be transmitted as directly as possible through the wall. Wall niches should be avoided. Other factors restricting transmission range:

- Switch mounted on metal surfaces (up to 30% loss of transmission range)
- Hollow lightweight walls filled with insulating wool on metal foil
- False ceilings with panels of metal or carbon fiber
- Lead glass or glass with metal coating, steel furniture

The distance between EnOcean receivers and other transmitting devices such as computers, audio and video equipment that also emit high-frequency signals should be at least 0.5 m

A summarized application note to determine the transmission range within buildings is available as download from www.enocean.com.

5 AGENCY CERTIFICATIONS

The modules have been tested to fulfil the approval requirements for CE (PTM 33x) and FCC/IC (PTM 33xC, PTM 330U) based on the built-in firmware.

5.1 CE approval

The modules bear the EC conformity marking CE and conform to the R&TTE EU-directive on radio equipment. The assembly conforms to the European and national requirements of electromagnetic compatibility. The conformity has been proven and the according documentation has been deposited at EnOcean. The modules can be operated without notification and free of charge in the area of the European Union, and in Switzerland. The following provisos apply:

- EnOcean RF modules must not be modified or used outside their specification limits.
- EnOcean RF modules may only be used to transfer digital or digitized data. Analog speech and/or music are not permitted.

- The final product incorporating EnOcean RF modules must itself meet the essential requirement of the R&TTE Directive and a CE marking must be affixed on the final product and on the sales packaging each. Operating instructions containing a Declaration of Conformity has to be attached.
- If the transmitter is used according to the regulations of the 868.3 MHz band, a so-called "Duty Cycle" of 1% per hour must not be exceeded. Permanent transmitters such as radio earphones are not allowed.
- The module must be used with only the following approved antenna(s).

Type	Parameter	Value
Wire/Monopole at RF_WHIP	Maximum gain	1.0 dBi
External antenna at RF_50	Antenna type	Passive
	Impedance	~50 Ohm
	Maximum gain	≤ 0 dBd

5.2 FCC (United States) Certification

5.2.1 PTM 330C and PTM 332C LIMITED MODULAR APPROVAL

This is an RF module approved for Limited Modular use operating as an intentional transmitting device with respect to 47 CFR 15.231(a-c) and is limited to OEM installation. The module is optimized to operate using small amounts of energy, and may be powered by a battery. The module transmits short radio packets comprised of control signals, (in some cases the control signal may be accompanied with data) such as those used with alarm systems, door openers, remote switches, and the like. The module does not support continuous streaming of voice, video, or any other forms of streaming data; it sends only short packets containing control signals and possibly data. The module is designed to comply with, has been tested according to 15.231(a-c), and has been found to comply with each requirement. Thus, a finished device containing the PTM 330C/PTM 332C/PTM 330U radio module can be operated in the United States without additional Part 15 FCC approval (approval(s) for unintentional radiators may be required for the OEM's finished product), under EnOcean's FCC ID number. This greatly simplifies and shortens the design cycle and development costs for OEM integrators. The module can be triggered manually or automatically, which cases are described below.

Manual Activation
The radio module can be configured to transmit a short packetized control signal if triggered manually. The module can be triggered, by pressing a switch, for example.
The packet contains one (or more) control signals that is(are) intended to control something at the receiving end. The packet may also contain data. Depending on how much energy is available from the energy source, subsequent manual triggers can initiate the transmission of additional control signals. This may be necessary if prior packet(s) was(were) lost to fading or interference. Subsequent triggers can also be initiated as a precaution if any doubt exists that the first packet didn't arrive at the receiver. Each packet that is transmitted, regardless of whether it was the first one or a subsequent one, will only be transmitted if enough energy is available from the energy source.

Automatic Activation
The radio module also can be configured to transmit a short packetized control signal if triggered automatically. Again, the packet contains a control signal that is intended to control something at the receiving end and may also contain data. As above, it is possible for the packet to get lost and never reach the receiver. However, if enough energy is available from the energy source, and the module has been configured to do so, then another packet or packets containing the control signal may be transmitted at a later time.

OEM Requirements
In order to use EnOcean's FCC ID number, the OEM must ensure that the following conditions are met:

- End users of products, which contain the module, must not have the ability to alter the firmware that governs the operation of the module. The agency grant is valid only when the module is incorporated into a final product by OEM integrators.
- The end-user must not be provided with instructions to remove, adjust or install the module.

- The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the final product. Attaching a label to a removable portion of the final product, such as a battery cover, is not permitted. The label must include the following text:

  PTM330C/PTM332C
  Contains FCC ID: SZV-PTM33XC
  The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

  When the device is so small or for such use that it is not practicable to place the statement above on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

  The user manual for the end product must also contain the text given above.

- Changes or modifications not expressly approved by EnOcean could void the user's authority to operate the equipment.

- The module must be used with only the following approved antenna(s).

Part Number	Type	Gain
N.A.	Wire/Monopole	1.0 dBi

- The OEM must ensure that timing requirements according to 47 CFR 15.231(a-c) are met.
- The OEM must sign the OEM Limited Modular Approval Agreement with EnOcean

5.2.2 PTM 330C and PTM 332C FCC Grant

TCB

GRANT OF EQUIPMENT AUTHORIZATION

Certification

Issued Under the Authority of the

Federal Communications Commission

By:

TCB

PHOENIX TESTLAB GmbH
Koenigswinkel 10
D-32825 Blomberg,
Germany

Date of Grant: 07/22/2010

Application Dated: 07/22/2010

EnOcean GmbH
Kolpingring 18a
Oberhaching, 82041
Germany

Attention: Armin Anders , Director Product Marketing

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: SZV-PTM33XC
Name of Grantee: EnOcean GmbH
Equipment Class: Part 15 Security/Remote Control Transmitter
Notes: 315 MHz Transmitter
Modular Type: Limited Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15.231	315.0 - 315.0			

5.2.3 PTM 330U FCC APPROVAL

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT! Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

The Original Equipment Manufacturer (OEM) must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the final product. Attaching a label to a removable portion of the final product, such as a battery cover, is not permitted. The label must include the following text:

PTM 330U

Contains FCC ID: SZV-PTM330U
The enclosed device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept any interference received, including interference that may cause undesired operation.

When the device is so small or for such use that it is not practicable to place the statement above on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

5.2.4 PTM 330U FCC Grant

TCB

GRANT OF EQUIPMENT AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

EMCCert Dr. Rasek GmbH
Stoernhofer Berg 15
D-91364 Unterleinleiter,
Germany

Date of Grant: 06/20/2013

Application Dated: 06/20/2013

EnOcean GmbH
Kolpingring 18a
Oberhaching, 82041
Germany

Attention: Armin Anders , Director Product Marketing

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: SZV-PTM330U
Name of Grantee: EnOcean GmbH
Equipment Class: Part 15 Security/Remote Control Transmitter
Notes: 902.875MHz transmitter

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15.231	902.875 - 902.875			

5.2.5 FCC Regulatory Statements

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Any changes or modifications not expressly approved by manufacturer could void the user's authority to operate the equipment.

IMPORTANT! Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.
Increase the separation between the equipment and receiver.
Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
Consult the dealer or an experienced radio/ TV technician for help.

5.3 IC (Industry Canada) Certification

In order to use EnOcean's IC number, the OEM must ensure that the following conditions are met:

- Labeling requirements for Industry Canada are similar to those required by the FCC. The Original Equipment Manufacturer (OEM) must ensure that IC labeling requirements are met. A clearly visible label on the outside of a non-removable part of the final product must include the following text:

  PTM 330C / PTM 332C:

  Contains IC: 5713A-PTM33XC

  PTM 330U:

  Contains IC: 5713A-PTM330U

- OEM wishing to use PTM 330C / 332C under limited modular approval conditions must sign the OEM Limited Modular Approval Agreement with EnOcean

Pour utiliser le numéro IC EnOcean, le OEM doit s'assurer que les conditions suivantes sont remplies:

- Les exigences d'étiquetage pour Industrie Canada sont similaires à ceux exigés par la FCC. Le fabricant d'équipement d'origine (OEM) doit s'assurer que les exigences en matière d'étiquetage IC sont réunies. Une étiquette clairement visible à l'extérieur d'une partie non amovible du produit final doit contenir le texte suivant:

  PTM 330C / PTM 332C:
  Contains IC: 5713A-PTM33XC
  Contient le module d'émission IC: 5713A-PTM33XC

  PTM 330U:
  Contains IC: 5713A-PTM330U
  Contient le module d'émission IC: 5713A-PTM330U

- L'OEM doit signer l'accord OEM limitée Approbation modulaire avec EnOcean pour utiliser PTM 330C / 332C.

5.3.1 PTM 330C and PTM 332C Industry Canada Technical Approval Certificate

PHOENIX TESTLAB

TECHNICAL APPROVAL CERTIFICATE
based on the Agreement on Mutual Recognition between the European Community and Canada

CERTIFICAT D'APPROBATION TECHNIQUE
en se basant l'accord de reconnaissance mutuelle entre la Communauté Européenne et le Canada

CERTIFICATE NUMBER *NUMÉRO DE CERTIFICAT*	**10-111340**
CERTIFICATION NUMBER *NUMÉRO DE CERTIFICATION*	**IC: 5713A-PTM33XC**
TYPE OF SERVICE *TYPE DE SERVICE*	**New Family Certification / Limited Modular Approval**
CERTIFICATE HOLDER *TITULAIRE DU CERTIFICAT*	**EnOcean GmbH Kolpingring 18a 82041 Oberhaching Germany**
TYPE OF EQUIPMENT *GENRE DE MATÉRIEL*	**Transmitter Module**
TRADE NAME AND MODEL NUMBER *MARQUE ET NUMÉRO DE MODELE*	**EnOcean PTM330C / PTM332C**
FREQUENCY RANGE *BANDE DE FRÉQUENCES*	**315MHz**
EMISSION DESIGNATION (TRC-43) *DÉSIGNATION D'ÉMISSION (CRT-43)*	**315KA1D**
R.F. POWER RATING (WATT) *PUISSANCE NOMINALE H.F (WATT)*	**/**
ANTENNA INFORMATION *INFORMATION D'ANTENNE*	**Wire Antenna 15cm**
CONTACT INFORMATION OF TESTING LABORATORY *COORDONNÉES DU LABORATOIRE DESSAI*	**Center for Quality Engineering SGS Germany GmbH Hoffmannstraße 50 81379 München Germany**
CERTIFIED TO / SPECIFICATION / ISSUE *CERTIFIÉ SELON LE / CAHIER DES CHARGES / ÉDITION*	**RSS-210 Issue 7, RSS-GEN Issue 2 RSS-102 Issue 4**

Certification of equipment means only that the equipment has met the requirements of the above noted specification. License applications, where applicable to use certified equipment, are acted on accordingly by the issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with the requirements of the radio standards specifications and procedures issued by the Department.

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de délivrance et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation. Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences aux procédures d' Industry Canada.

Labelling of Certified Radio Equipment: Equipment that has received certification but is not labelled with the applicant's name, model number and the certification number as outlined above is not considered certified.

***Étiquetage du matériel radio homologué*: Le matériel pour lequel une certification a été obtenue mais qui n'est pas étiqueté conformément aux exigences ci-dessus (nom du requérant, numéro de modèle et numéro de certification) n'est pas considéré comme certifié.**

Certification Body Code: DE0003

recognised by Bundesnetzagentur

Signed by / *Signataire* Uwe Dollitz

Blomberg, 23 July 2010

Foreign Certification Body (FCB)

BNetzA-CAB-04/22-53

PHOENIX TESTLAB GmbH • Königswinkel 10 D-32825 Blomberg, Germany • Phone: +49 (0)5235-9500-0 • Fax: +49 (0) 5235-9500-10
http://www.phoenix-testlab.de

5.3.2 PTM 330U Industry Canada Technical Approval Certificate

EMCC DR. RAŠEK

FCB under the Canada-EC MRA
TCB under the USA-EC MRA
RFCAB under the Japan-EC MRA
Notified Body R&TTE Directive 99/5/EC
Notified Body EMC Directive 2004/108/EC

No. ► CA001351D

TECHNICAL ACCEPTANCE CERTIFICATE CANADA

CERTIFICAT D'ACCEPTABILITÉ TECHNIQUE CANADA

CERTIFICATION No. / No. DE CERTIFICATION	► 5713A-PTM330U		
ISSUED TO / DÉLIVRÉ A	► EnOcean GmbH		
Street Address / Numéro et rue	Kolpingring 18 a	City / Ville	Oberhaching
Province or State / Province ou État	Germany	Postal Code / Code postal	82041
TYPE OF EQUIPMENT / GENRE DE MATÉRIEL	► Remote Control Device	TRADE NAME & MODEL / MARQUE ET MODELE	► Transmitter Module PTM 330U
FREQUENCY RANGE / BANDE DE FRÉQUENCES	► 902.88 - 902.88 MHz	EMISSION TYPE / GENRE D'ÉMISSION	► 299K7F1DAN
R.F. POWER / PUISSANCE H.F.	► 59.86 dBµV/m @ 3m	ANTENNA / ANTENNE	► Integrated / Incorporé
SPECIFICATION / SPÉCEFICATION	► RSS-210	ISSUE / ÉDITION 8	11 December 2010
TEST LABORATORY / LABORATOIRE D'ESSAI	► EMCCons DR. RAŠEK GmbH & Co. KG	CN 3464C	OATS 3461C-1
Street Address / Numéro et rue	Moggast, Boelwiese 8	City / Ville	Ebermannstadt
Province or State / Province ou État	Germany	Postal Code / Code postal	91320
Name / Nom	Karlheinz Kraft	Tel	0049 9194 9016
E-mail	k.kraft@emcc.de	Fax	0049 9194 8125

Certification of equipment means only that the equipment has met the requirements of the above-noted specification. Licence applications, where applicable to use certified equipment, are acted on accordingly by the Industry Canada issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with the requirements and procedures issued by Industry Canada. The equipment for which this certificate is issued shall not be manufactured, imported, distributed, leased, offered for sale or sold unless the equipment complies with the applicable technical specifications and procedures issued by Industry Canada.

I hereby attest that the subject equipment was tested and found in compliance with the above-noted specification.

La certification du matériel signifie seulement que le matériel a satisfait aux exigencies de la norme indiquée ci-dessus. Les demandes de licences néoessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de deliverance d'Industrie Canada et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation. Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procedures d'Industrie Canada. Le matériel à l'égard duquel le présent certificat est délivré ne doit pas être fabriqué, importé, distribué, loué, mis en vente ou vendu à moins d'être conforme aux procédures et aux spécifications techniques applicables publiées par Industrie Canada.

J'atteste par la présente que le matériel a fait l'objet d'essai et jugé conforme à laspécification ci-dessus.

DATE 21 June 2013

Certification Officer

EMCCert DR. RAŠEK GmbH • Stoernhofer Berg 15, 91364 Unterleinleiter, Germany
Tel.: +49 9194 72279-01 • Fax: +49 9194 72279-06 • E-mail: emc.cert@emcc.de • Web: www.emcc.de

5.3.3 Industry Canada Regulatory Statements

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement.

IMPORTANT! Tous les changements ou modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actioner cet équipment.

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada